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**Intermountain
Region**

**Ogden, Utah**

# Forest Insect and Disease Conditions in the Intermountain Region 1992

# FOREST INSECT AND DISEASE CONDITIONS

# in the

# Intermountain Region

# 1992


**Compiled by:**
**A. Knapp**
**D. Hansen**
**V. DeBlander**
**R. Williams**
**L. LaMadeleine**

**Forest Pest Management**
**State and Private Forestry**
**USDA Forest Service**
**Intermountain Region**
**324 - 25th Street**
**Ogden, Utah 84401**



**September**
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## FOREST PEST MANAGEMENT
## INTERMOUNTAIN REGION


**Regional Office**
**324 - 25th Street**
**Ogden, Utah 84401**
**(801) 625-5257**
**FTS (801) 625-5257**
**FAX (801) 625-5127**

| | |
|---|---|
| David G. Holland | Group Leader |
| Garth E. Baxter | Pesticide Coordinator |

**Ogden Field Office**
**4746 South 1900 East**
**Ogden, Utah 84403**
**(801) 476-9720**
**FTS (700) 321-9720**
**FAX (801) 479-1477**

| | |
|---|---|
| Leon LaMadeleine | Plant Pathologist/<br>Ogden Field Office Representative |
| John A. Anhold | Entomologist |
| Dawn E. Hansen | Entomologist |
| A. Steven Munson | Entomologist |
| John C. Guyon | Plant Pathologist |
| Valerie L. DeBlander | Forestry Technician |
| Gary J. Otwell | Biological Technician |
| Alan D. Dymerski | Forestry Technician |
| Nancy P.Wright | Computer Assistant |

**Boise Field Office**
**1750 Front Street, Room 202**
**Boise, Idaho 83702**
**(208) 364-4220**
**FTS (208) 364-4220**
**FAX (208) 364-4111**

| | |
|---|---|
| Ralph E. Williams | Plant Pathologist/<br>Boise Field Office Representative |
| Ralph W. Thier | Entomologist |
| Julie C. Weatherby | Entomologist |
| James T. Hoffman | Plant Pathologist |
| Joy C. Roberts | Computer Programmer Analyst |
| K. Andrew Knapp | Biological Technician |
| Philip J. Mocettini, Jr. | Biological Technician |
| Richard L. Halsey | Biological Technician |
| Sara Stolz | Biological Technician |
| Thomas N. Barbouletos | Forester |
| Janet Cheney | Office Management Assistant |

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# INTRODUCTION

This report briefly summarizes the status of insect and disease pests of forest trees in the Intermountain Region. Status of insects is based largely on annual and special aerial detection surveys which are conducted over 14,000,000 acres of forested lands. Status of diseases is based largely on ground observations and surveys.

General insect and disease information is summarized in the Résumé of Conditions.

Numbers of trees killed by major bark beetles and acreage of defoliating insect activity are displayed in Tables 1 through 11. Estimates are based on aerial survey information. General location of major insect activity is shown in Figures 1 through 10.

Recent publications are listed to aid the reader in locating specific, recent pest information of interest.

## RÉSUMÉ OF CONDITIONS

During 1992 , mountain beetle activity decreased in lodgepole and ponderosa pine and increased in whitebark pine. Approximately 16,900 dying trees were detected this year compared to 33,700 trees in 1991. The largest decrease in tree mortality occurred on the Sawtooth National Forest where 5,300 lodgepole pine were killed. Elsewhere, significant reductions in tree mortality occurred on the Boise, Challis, and Targhee National Forests in southern Idaho, and on the Dixie National Forest in Utah. Static activity levels were noted on the Caribou and Manti-LaSal National Forests in southern Idaho and Utah respectively, while increases in activity occurred on the Bridger-Teton National Forest in western Wyoming. Increases in mountain pine beetle activity in whitebark pine increased on the Payette and Bridger-Teton National Forests in southern Idaho and western Wyoming, respectively.

Increases in tree mortality attributed to the spruce beetle occurred with 56,000 trees killed in 1992 compared to 41,500 trees killed in 1991. Most of this increase in activity occurred from expansion of the two largest infestations in the Region, located on the Payette National Forest in southern Idaho and on the Manti-LaSal National Forest in Utah. Elsewhere in the Region, isolated infestations were located on the Wasatch-Cache National Forest and Fishlake National Forests, while a larger outbreak is located on the Dixie National Forest. Activity on the Bridger-Teton National Forest in western Wyoming remained static.

Douglas-fir beetle activity increased during 1992 with 118,900 trees killed compared to 89,800 in 1991. In southern Idaho, significant increases occurred on the Boise, Caribou, and Sawtooth National Forests; decreases in activity occurred on the Targhee National Forest; and static levels of activity occurred on the Challis, Salmon, and Payette National Forests. In Utah, significant increases in mortality were noted on the Wasatch-Cache National Forests; while only small isolated infestations were present elsewhere. Static levels of activity were present on the Bridger-Teton National Forest in western Wyoming.

After two years of significant decreases in tree mortality, western pine beetle activity remained relatively static with 8,800 trees killed. Mortality is concentrated on the Boise and Payette National Forests in southern Idaho. Ips beetle attacks within areas of western pine beetle activity continue to increase. Elsewhere in the Region, western pine beetle activity was not observed.

During 1992 within areas surveyed approximately 187,200 subalpine fir trees died from attack by western balsam bark beetle. While this is a numerical decrease from 1991, it is likely that activity may actually be static to increasing. A significant portion of the Caribou National Forest in southern Idaho was not surveyed this year and ground observations within these aerially unsurveyed areas indicate that extensive western balsam bark activity is present. In southern Idaho, activity increased on the Sawtooth, decreased on the Boise National Forest and remained static on the Targhee National Forest. In Utah, on the Wasatch-Cache National Forest, where the largest infestation in the Region is located, activity increased. Decreases in activity occurred on the Uinta and Manti-LaSal National Forests. In western Wyoming, activity decreased on the Bridger-Teton National Forest.

Fir engraver beetle continued to cause extensive mortality of true fir trees throughout the Region with 249,400 dying trees detected, currently the largest bark beetle outbreak in the Region. Most of the activity was located on the Toiyabe National Forest in western Nevada where 193,000 red and white fir were killed. In Utah, mortality of white fir on the Wasatch-Cache National Forest increased significantly from past years. Mortality of grand fir in southern Idaho increased on the Payette National Forest and decreased on the Boise National Forest.

Mortality of Jeffrey pine by the Jeffrey pine beetle on the Toiyabe National Forest in western Nevada increased within the Tahoe Basin. Elsewhere on the Forest, decreasing mortality levels were noted.

Defoliation of Douglas-fir and true fir by western spruce budworm remained relatively static with 49,300 acres visibly defoliated during 1991 compared to 42,900 acres in 1990. All aerially visible defoliation was located in southern Idaho. The largest infestation, located on the Salmon National Forest, covers 46,200 acres. Elsewhere, 2,200 and 900 acres of defoliation were recorded on the Challis and Targhee National Forests, respectively. Ground surveys detected very light defoliation within the Beaver River drainage on the Fishlake National Forest in southern Utah.

Conifers on approximately 316,900 acres were defoliated by Douglas-fir tussock moth in Idaho and Utah. This was the largest acreage of Douglas-fir tussock moth defoliation ever recorded in the Region. In Idaho, 312,000 acres of defoliation were recorded on the Boise, Payette, and Sawtooth National Forests. Additionally, on Bureau of Land Management and State lands east of Bellevue and in the Owyhee Mountains south of Boise, considerable defoliation was mapped. In Utah, 4,900 acres of defoliation were mapped on the Wasatch-Cache National Forest and adjacent State land.

The largest infestation is located on the Boise National Forest and contiguous areas of the Sawtooth National Forest where primarily Douglas-fir is infested. Elsewhere on the Boise National Forest, extensive areas of grand fir on the Emmett Ranger District were visibly defoliated. Visible defoliation was not observed on Bald Mountain near Sun Valley, Idaho; however, higher than normal populations of the insect were detected during ground surveys. On the Payette National Forest, 18,500 acres of Douglas-fir and grand fir were defoliated in a unique infestation consisting of both Douglas-fir tussock moth and western spruce budworm. Subalpine fir, Douglas-fir, and white fir on the Wasatch-Cache National Forest were defoliated at elevations of 8,000 to 8,500 feet; one of the highest elevation Douglas-fir tussock moth infestations recorded. Defoliation levels, based on the percent of the tree crown displaying larval feeding damage, were generally very heavy throughout the Region.

1992 was the fourth year of the Utah Gypsy Moth Eradication Program.The program includes quaratine of infested areas, treatment with the biological insecticide, *Bacillus thuringiensis,* pheromone trapping, speical projects and strong public information/education. Move-in trapping will continue throughout the state as the first line of detection of new introductions of the gyspy moth into Utah.

The first aerial treatment of gypsy moth in Utah was in 1989 on 1,190 acres. In 1990, 1991, and 1992, the acres treated were 20,064, 29,925, and 15,718, respectively. The increase in the acreages needing treatment was due to a more effective trapping program. More pheromone traps were set out and they were set out in more difficult terrain. It appears that the populations have been well delimited and the acreage requiring treatment in 1993 has decreased to 5,135 acres, a reduction of 66 percent from 1992.

In 1992, 94 male moths were caught. This is a reduction of 96 percent from the 2,274 moths caught at the conception of the project in 1989. There was one moth caught at a move-in site this year. From these trapping results, nine areas in three counties of northern Utah are being proposed for treatment in 1993. B.t. will be applied in three applications spaced five to seven days apart.

Multiagency gypsy moth monitoring occurred in all states encompassed within the Intermountain Region. Gypsy moths were detected in pheromone-baited traps in Yellowstone Park, Wyoming. No moths were caught in Nevada and southern Idaho.

Because of the difficulty in aerially detecting visible symptoms, detection and monitoring of most forest pathogens is accomplished via ground surveys. Activity of many disease agents is reported only in general terms because of the sporadic and short duration of most foliar pathogens and the relatively static nature of root, stem, and branch pathogens and the difficulty in assessing change. Since this report reflects the change in pest status from year to year, disease information is frequently ommited unless a significant change has occurred. It should not be construed that forest diseases are absent or unimportant within the Region. In fact, they likely cause more direct mortality and growth loss than do insect pests.

## Status of insects in southern Idaho, Nevada, Utah, and western Wyoming

| Insect | Host | Location | Remarks |
|---|---|---|---|
| **Cooley spruce gall adelgid** *Adelges cooleyi* | Spruce | Idaho, Utah, Wyoming | This adelgid was found in forested stands and ornamental trees throughout the Region; impact appeared greatest in ornamental trees. |
| **Douglas-fir beetle** *Dendroctonus pseudotsugae* | Douglas-fir | Idaho, Utah, Wyoming | Mortality increased in Idaho and Utah, and decreased in Wyoming. In southern Idaho, 105,500 trees killed; the largest infestations were located on the Boise, Payette and Sawtooth National Forests; smaller infestations were located on the Challis, Salmon, and Targhee National Forests. In Utah, 5,100 trees were killed, a significant increase from 1991. The largest infestation was located on the Wasatch-Cache National Forest; smaller infestations occurred on the Ashley and Manti-LaSal National Forests. In Wyoming, activity was static with 8,300 trees killed on the Bridger-Teton National Forest. |

## Status of insects in southern Idaho, Nevada, Utah, and western Wyoming

| Insect | Host | Location | Remarks |
|---|---|---|---|
| **Douglas-fir tussock moth** *Orgyia pseudotsugata* | Douglas-fir, True firs | Idaho, Utah | Defoliation increased from 316,000 acres in 1991 to 421,000 acres in 1992, with most of the increased acreage of defoliation occurring in southern Idaho. This is the most defoliation caused by Douglas-fir tussock moth ever recorded in the Region. In Idaho, 418,000 acres of defoliation were detected on the Boise National Forest and contiguous areas of the Sawtooth National Forest, on the Payette National Forest, throughout the Owyhee Mountains, and along the Big Wood River drainage near Ketchum. In northern Utah, 3,200 acres of defoliation were detected on the Wasatch-Cache National Forest, a decrease from 1991 levels. Regionwide, most defoliation was classified as moderate to heavy with significant mortality occurring in areas with three consecutive years of defoliation. |
| **Fir engraver beetle** *Scolytus ventralis* | Grand fir, White fir, Red fir, Subalpine fir | Idaho, Utah, Nevada, Wyoming | True fir mortality attributed to fir engraver beetle attack remained static in Nevada and Utah while significantly increasing in Idaho. Approximately 269,800 trees were killed Regionwide compared to 249,400 trees in 1991. In Nevada, 195,100 trees were killed on the Toiyabe National Forest, the largest infestation in the Region. In Idaho, 41,900 trees were killed, primarily on the Boise National Forest. In Utah, 32,800 trees were killed on the Wasatch-Cache National Forest. |
| **Forest tent caterpillar** *Malacosoma disstria* | Gamble oak, Apple, Cherry | Utah | Heavy defoliation on approximately 550 acres occurred on the Pleasant Grove Ranger District of the Uinta National Forest. |

## Status of insects in southern Idaho, Nevada, Utah, and western Wyoming

| Insect | Host | Location | Remarks |
|---|---|---|---|
| **Jeffrey pine beetle** *Dendroctonus jefferyi* | Jeffery pine | Nevada | On the Toiyabe National Forest, tree mortality, totaling 10,900 trees, occurred throughout the Lake Tahoe Basin in western Nevada and on the Las Vegas Ranger District in southern Nevada. |
| **Mountain pine beetle** *Dendroctonus ponderosae* | Lodgepole pine, Ponderosa pine | Idaho, Utah, Wyoming | Decreases in lodgepole and ponderosa pine mortality occurred in Idaho and Wyoming. In southern Idaho, 10,600 trees were killed in 1992, while in 1991, 30,400 trees were killed. The largest center of mortality in the Region was located within the Sawtooth National Recreation Area on the Sawtooth National Forest. Smaller outbreaks occurred on the Boise and Challis National Forests. In Utah, mountain pine beetle killed 3,600 trees. Increases in tree mortality occurring on the Wasatch-Cache and Dixie National Forests, while activity on the Manti-LaSal National Forest remained static. On the Bridger-Teton National Forest in western Wyoming, 1,400 trees were killed compared to 1,700 trees in 1991. |
| **Mountain pine beetle** *Dendroctonus ponderosae* | Whitebark pine | Idaho, Utah, Wyoming, Nevada | Increases in mountain pine beetle activity in whitebark pine occurred in Idaho and western Wyoming. On the Payette National Forest in southern Idaho, 2,000 dying trees were detected, while on the Bridger-Teton National Forest in western Wyoming, 1,300 trees were detected. Smaller, less extensive infestations occurred in Utah and Nevada. |
| **Oyster shell scale** *Lepidosaphes ulmi* | *Populus* spp. | Utah | Moderate to heavy populations of this insect, infesting cottonwoods and aspen, were located in Ranch Canyon on the BLM Beaver Resource Area near Milford, Utah. Damage was variable, ranging from single branch to tree mortality. |

## Status of insects in southern Idaho, Nevada, Utah, and western Wyoming

| Insect | Host | Location | Remarks |
|---|---|---|---|
| **Pine engraver beetle** *Ips pini* | Lodgepole pine, Ponderosa pine | Idaho, Utah, Nevada | This insect, often associated with western pine beetle and Jeffrey pine beetle, occurred throughout southern Idaho and western Nevada. |
| **Red turpentine beetle** *Dendroctonus valens* | Ponderosa pine | Idaho, Utah, | Partially scorched trees were attacked in a small area near Buckeye Mountain on the Moab Ranger District of the Manti-LaSal National Forest. Activity occurred throughout burned areas in southern Idaho. |
| **Silver fir beetle** *Pseudohylesinus sericeus* | Grand fir | Idaho | This beetle overwinters under the bark in the root collars of grand fir and signs of this overwintering population were evident in 1991. These infested trees were not killed by the silver fir beetle. No additional reports of this insect were noted in 1992. |
| **Spruce beetle** *Dendroctonus rufipennis* | Spruce | Idaho, Utah, Wyoming | Activity, totaling 56,000 trees killed, an increase from 1991, occurred throughout the Region. In Idaho, 32,000 trees were killed on the Payette National Forest, the largest outbreak in the Region. In Utah, 20,500 trees were killed on the Manti-LaSal National Forest. Smaller outbreaks are present on the Dixie and Fishlake National Forests. In Wyoming, static levels of activity were observed on the Bridger-Teton National Forest with 900 trees detected. |
| **Spruce engraver** *Ips pilifrons* | Spruce | Utah | Moderate infestations of this insect were found in Peterson Grove on the Teasdale Ranger District, Dixie National Forest. |

## Status of insects in southern Idaho, Nevada, Utah, and western Wyoming

| Insect | Host | Location | Remarks |
|---|---|---|---|
| **Spruce seed moth** *Laspeyresia youngana* | Spruce | Utah | Moderate populations were found infesting cones on the Fishlake National Forest in Utah. |
| **Sugar pine tortrix** *Choristoneura lambertiana* | Pines | Idaho | Light to moderate defoliation of lodgepole pines occurred in scattered 5-10 acre pockets on the Salmon National Forest, Idaho. |
| **Western balsam bark beetle** *Dryocoetes confusus* | Subalpine fir | Idaho, Utah, Wyoming | Increases in mortality occurred Regionwide with 244,400 dying subalpine fir observed. In southern Idaho 118,100 trees were killed and extensive areas of the Caribou, Sawtooth and Targhee National Forests are infested. Smaller infestations are present on the Boise, Challis and Salmon National Forests. In Utah 41,800 trees were killed: mortality is located on the Manti-LaSal, Uinta, and Wasatch-Cache National Forests. On the Bridger-Teton National Forest in western Wyoming 84,500 trees were killed. |
| **Western pine beetle** *Dendroctonus brevicomis* | Ponderosa pine | Idaho | Beetle populations continued to collapse on the Boise and Payette National Forests with only 8,200 trees killed during 1991 compared to 23,800 trees in 1990. |
| **Western spruce budworm** *Choristoneura occidentalis* | Douglas-fir, True firs | Idaho | Defoliation levels remained static with 49,300 acres defoliated in 1991 compared to 42,900 acres in 1990. All aerially visible defoliation occurred in southern Idaho. Most defoliation is located on the Salmon National Forest while smaller infestations are located on the Challis and Targhee National Forests. Defoliation intensity was classified as mostly light. Light defoliation was observed during ground surveys on the Fishlake National Forest in southern Utah. |

## Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming

| Disease | Host | Location | Remarks |
|---|---|---|---|
| **Stem and Branch Diseases** | | | |
| **Aspen trunk rot**<br>*Phellinus tremulae* | Aspen | Idaho, Nevada, Utah, Wyoming | Decay occurs in most aspen stands in the Region. |
| **Comandra blister rust**<br>*Cronartium comandrae* | Lodgepole pine, Ponderosa pine | Idaho, Utah, Wyoming | Infection occurs infrequently throughout Idaho and Utah. Heavy, localized areas of infection resulting in branch, top and entire tree mortality of sapling-size ponderosa pines occurred in south Idaho. In Wyoming and northern Utah, infection frequently occurs on lodgepole pine in localized pockets. |
| **Pinyon blister rust**<br>*Cronartium occidentale* | Pinyon pine | Idaho, Utah | This disease was observed on the Moab Ranger District, Manti-LaSal National Forest, Utah and in the Raft River Mountains on the Sawtooth National Forest, Idaho. |
| **Cytospora canker of true firs**<br>*Cytospora abietis* | True firs | Idaho, Utah, Wyoming | Branch flagging, top-killing and mortality attributed to this fungus occurred in localized areas throughout host type. This disease was frequently found occurring with western balsam bark beetle attacks. |
| **Canker of subalpine fir**<br>(*Pleurocytospora*-like) | Subalpine fir | Idaho | Branch flagging, top-killing and mortality attributed to this fungus occurred in localized areas throughout host type. Infection levels declined in southern Idaho. |

## Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming

| Disease | Host | Location | Remarks |
|---|---|---|---|
| **Dwarf mistletoes** *Arceuthobium spp.* | Douglas-fir, Lodgepole pine, Ponderosa pine, Western larch, Jeffrey pine, True firs | Idaho, Wyoming, Utah Nevada | Suppression projects continue to remove infected overstory trees; however this forest disease remains the most widespread and frequently observed disease within the Intermountain Region. Regional incidence by major host species is as follows: lodgepole pine = 45% infected, ponderosa pine = 25% infected, and Douglas-fir = 33% infected. |
| **True mistletoe on Juniper** *Phoradendron juniperinum* | Junipers | Utah, Nevada | This pest occurs on juniper on the Fishlake and Dixie National Forests in Utah and in the Great Basin National Park in Nevada. |
| **Limb rust** *Peridermium filamentosum* | Ponderosa pine | Utah | Infection causing branch mortality and occasional tree mortality occurs in all size classes of trees on the Dixie National Forest in southern Utah. |
| **Red ring rot** *Phellinus pini* | Western larch, True firs, Spruce, Douglas-fir, Pines | Idaho, Utah, Wyoming | Infection intensity varies throughout stands in the Region. |
| **Rust-red stringy rot** *Echinodontium tinctorium* | Grand fir, White fir, Subalpine fir | Idaho, Nevada, Utah | Decay caused by this fungus is common in mature and overmature stands of true firs. |
| **Stalactiform blister rust** *Cronartiumn coleosporiodes* | Lodgepole pine | Idaho, Utah, Nevada | This rust occurs in localized areas throughout the host type. Heavy infection has been noted in localized areas on the Boise, Payette, Sawtooth and Targhee National Forests in Idaho. |
| **Other stem decays:** *Cryptoporus volvatus* *Fomitopsis officinalis* *Polyporous sulphureus* | All tree species | Idaho, Utah, Nevada, Wyoming | A large number of minor stem decay agents, too numerous to list, occur with varying intensity throughout the Region. |

**Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming**

| Disease | Host | Location | Remarks |
|---|---|---|---|
| **Western gall rust** *Endocronartium harknessii* | Lodgepole pine, Ponderosa pine | Idaho, Utah, Wyoming | Gall rust occurs extensively within the host types. Varied infection levels are observed with localized heavy infection levels present in both host species. |
| **Root Diseases** | | | |
| **Annous root disease** *Heterobasidion annosum* | Douglas-fir, Engelmann spruce, Lodgepole pine, Ponderosa Pine, Jeffrey Pine, True firs | Idaho, Nevada, Utah, Wyoming, California | Infection causes varying amounts of root and butt rot in mature individuals of many tree species, and may result in predisposition to windthrow and/or beetle attack.In grand fir and subalpine fir, it is most commonly found as a butt rot. Infection-induced mortality occurs occasionally in young ponderosa pine and seldom in other hosts. |
| **Armillaria root disease** *Armillaria* sp. | Douglas-fir, Grand fir, Pines, Spruce, Subalpine fir | Idaho, Nevada, Utah, Wyoming | Evidence of Armillaria root disease can be found throughout the Region. In southern Idaho, northern Utah, Nevada, and Wyoming, it functioned primarily as a weak pathogen or saprophyte causing little direct mortality. In southern Utah, in some cases, it acts as a primary pathogen killing mature and immature ponderosa pine and mature fir and spruce. |
| **Artist's conk** *Ganoderma applanatum* | Aspen | Idaho, Nevada, Utah, Wyoming | This pathogen is commonly observed in association with windthrown aspen on the Dixie and Fishlake National Forests in Utah, and Humboldt National Forest in Nevada. |
| **Black stain root disease** *Ophiostoma wageneri, (=Ceratocystis wagenerii)* | Pinyon pine | Idaho, Nevada, Utah | This fungus causes mortality of pinyon pine on the Bureau of Land Management Burley District in Idaho, on the Humboldt and Toiyabe National Forests in Nevada, and on the Dixie and Manti-LaSal National Forest in Utah. |

## Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming

| Disease | Host | Location | Remarks |
|---|---|---|---|
| **Schweinitzii butt rot**<br>*Phaeolus schweinitzii* | Douglas-fir,<br>Ponderosa pine | Idaho | Decay is common in mature and overmature forests throughout the host type, especially those having a fire or logging history. The fungus is often associated with other root pathogens and bark beetle activity. Trees are seldom killed directly as a result of infection. |
| **Tomentosus root disease**<br>*Inonotus tomentosus* | Douglas-fir,<br>Spruce,<br>Subalpine fir | Idaho,<br>Utah | This fungus is found alone or associated with *Phaleolus schweinitzii* and *Armillaria spp.*. It causes root and butt rot of pole-sized and larger trees predisposing trees to bark beetle attack and windthrow in southern Idaho. In southern Utah, it kills pole-sized and larger spruce in progressively enlarging disease centers. |
| **Foliage Diseases** | | | |
| **Conifer - Aspen rust**<br>**Conifer - Cottonwood rust**<br>*Melampsora medusae*<br>*Melampsora occidentalis* | Aspen,<br>Conifers,<br>Cottonwood | Idaho | Infected cottonwood and aspen were commonly observed in southern Idaho. Some aspen clones were severely defoliated by these fungi. Limited infection of the alternate host conifers was confirmed. |
| **Douglas-fir needle cast**<br>*Rhabdocline* spp. | Douglas-fir | Idaho | Incidence decreased with light infection noted throughout the range of Douglas-fir in southern Idaho. |
| **Elytroderma disease**<br>*Elytroderma deformans* | Ponderosa pine | Idaho | Systemic and annual infections occur throughout the host type and are especially severe in southwestern Idaho. Except in the systemic "brooms," new foliage discoloration caused by this fungus decreased in 1992. |

## Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming

| Disease | Host | Location | Remarks |
|---|---|---|---|
| **Incense cedar broom rust** *Gymnosporangium libocedri* | Incense cedar | Nevada, California | This disease occurs in isolated patches of host trees on the Toiyabe National Forest in Nevada and California. |
| **Fir broom rust** *Melampsorella caryophyllacearum* | Subalpine fir | Idaho, Nevada, Utah, Wyoming | Infections occur throughout the host's range. Infection intensity varies significantly, but is pandemic in stands south of the Snake River in Idaho. |
| **Fir needle cast** *Lirula* spp. | Subalpine fir, Grand fir | Idaho | Infection occurred at endemic levels throughout the host type. |
| **Fir needle rust** *Pucciniastrum epilobii* | Subalpine fir | Idaho, Wyoming | Seedling and sapling size trees throughout the host type were variably infected. |
| **Larch needle blight** *Hypodermella larices* | Western larch | Idaho | Incidence and severity of infection in west central Idaho were very light. Detection was confounded by severe frost damage that occurred shortly after spring needle flush. |
| **Larch needle cast** *Meria laricis* | Western larch | Idaho | Incidence and severity of infection in west central Idaho were very light. Detection was confounded by severe frost damage that occurred shortly after spring needle flush. |
| **Marssonia blight** *Marssonina populi* | Aspen | Idaho, Utah, Wyoming | Scattered incidence of moderate to heavy intensity was noted throughout most of the hosts range in southern Idaho, northern Utah, and western Wyoming. |
| **Shepherd's crook** *Venturia macularis* | Aspen | Idaho, Utah | Scattered incidence of light to moderate intensity was noted in southern Idaho and throughout Utah. |
| **Spruce broom rust** *Chrysomyxa arctostaphylii* | Engelmann spruce | Idaho, Utah, Wyoming | Scattered infections occurred throughout the host type, especially in eastern Idaho and in localized pockets on the Fishlake National Forest, Utah. |

## Status of diseases in southern Idaho, Nevada, Utah, and western Wyoming

| Disease | Host | Location | Remarks |
|---|---|---|---|
| **Pine needle rust** *Colesporium* spp. | Ponderosa pine, Lodgepole pine | Idaho | Scattered incidence of light to moderate intensity occurred scattered throughout the host types in southern Idaho. |
| **Nursery Diseases** | | | |
| **Fusarium root disease** *Fusarium oxysporum* | True firs, Douglas-fir, Ponderosa pine | Idaho, Utah | This disease caused small amounts of mortality primarily of 1-0 conifer seedlings at the Lucky Peak Nursery, Boise National Forest, Idaho and the Lone Peak Nursery in Utah. |
| **Fusarium cortical stem rot** *Fusarium avenaceum* | True firs, Douglas-fir, Ponderosa pine | Idaho, Utah | This disease caused scattered mortality primarily of 1-0 conifer seedlings at the Lucky Peak Nursery, Boise National Forest, Idaho and the Lone Peak Nursery in Utah. |
| **Phytophthora/ Pythium root rot** *Phytophthora* spp., *Pythium* spp. | Douglas-fir, Spruce | Idaho, Utah | These fungi occur on seedlings and in soil at the Lucky Peak Nursery, Boise National Forest, Idaho and the Lone Peak Nursery in Utah. Infection results in mortality and culling of 2-0 seedlings. |
| **Abiotic** | | | |
| **Drought effects** | All vegetation | Regionwide | Premature needle drop, leaf scorch, and seedling mortality were observed due to six consecutive years of below normal precipitation. Damage was especially apparent on the Toiyabe National Forest in Nevada. |
| **Spring Frost** | Western larch | Idaho | An early spring frost killed foliage on the Payette National Forest, Idaho. |

**TABLE 1.**--*Number of trees killed and acres infested by* ***bark beetles*** *in Region 4 during 1992 as determined by aerial detection surveys.*

| | Mountain Pine Beetle | | Douglas-fir Beetle | | *Ips*/Western Pine Beetle | | Spruce Beetle | | Fir Engraver Beetle | | Western Balsam Bark Beetle | | Jeffrey Pine Beetle | | Totals | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Forest* | Trees | Acres | Trees | Acres | Trees | Acres | Trees | Acres | Trees | Acres | Trees | Acres | Trees | Acres | Trees | Acres |
| Ashley | 100 | 100 | 300 | 200 | -- | -- | -- | -- | -- | -- | 1,200 | 1,400 | -- | -- | 1,600 | 1,700 |
| Boise | 800 | 1,200 | 34,900 | 51,600 | 5,800 | 6,100 | 100 | 600 | 41,900 | 23,900 | 3,500 | 4,500 | -- | -- | 87,000 | 87,900 |
| Bridger-Teton | 2,700 | 5,300 | 8,300 | 1,900 | -- | -- | 900 | 1,100 | -- | -- | 36,800 | 154,100 | -- | -- | 48,700 | 162,400 |
| Caribou | 200 | 100 | 8,000 | 5,000 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 8,200 | 5,100 |
| Challis | 1,300 | 1,000 | 900 | 600 | -- | -- | -- | -- | -- | -- | 2,400 | 2,000 | -- | -- | 4,600 | 3,600 |
| Dixie | 2,500 | 2,900 | -- | -- | -- | -- | 1,900 | 2,900 | -- | -- | 9,200 | 6,100 | -- | -- | 13,600 | 11,900 |
| Fishlake | -- | -- | -- | -- | -- | -- | 600 | 300 | -- | -- | -- | -- | -- | -- | 600 | 300 |
| Manti-LaSal | 300 | 200 | 200 | 100 | -- | -- | 20,500 | 12,000 | -- | -- | 4,200 | 3,400 | -- | -- | 25,200 | 15,700 |
| Payette | 2,000 | 1,900 | 15,800 | 14,800 | 2,800 | 2,200 | 31,700 | 31,200 | -- | -- | -- | -- | -- | -- | 52,300 | 50,100 |
| Salmon | 800 | 700 | 8,700 | 6,900 | -- | -- | 100 | 100 | -- | -- | 400 | 500 | -- | -- | 10,000 | 8,200 |
| Sawtooth | 5,300 | 3,800 | 31,300 | 14,200 | 200 | 600 | -- | -- | -- | -- | 25,200 | 17,000 | -- | -- | 62,000 | 35,600 |
| Targhee | 200 | 100 | 5,900 | 6,500 | -- | -- | -- | -- | -- | -- | 48,800 | 34,500 | -- | -- | 54,900 | 41,100 |
| Toiyabe | -- | -- | -- | -- | -- | -- | -- | -- | 195,100 | 77,400 | -- | -- | 10,900 | 10,300 | 206,000 | 87,700 |
| Uinta | -- | -- | 100 | 200 | -- | -- | -- | -- | -- | -- | 5,700 | 8,200 | -- | -- | 5,800 | 8,400 |
| Wasatch-Cache | 700 | 900 | 4,500 | 2,700 | -- | -- | 200 | 800 | 32,800 | 22,300 | 49,800 | 30,200 | -- | -- | 88,000 | 56,900 |
| TOTAL | 16,900 | 18,200 | 118,900 | 104,700 | 8,800 | 8,900 | 56,000 | 49,000 | 269,800 | 123,600 | 187,200 | 261,900 | 10,900 | 10,300 | 668,500 | 576,600 |

* *Only portions of Forests and adjacent land flown; actual mortality figures are probably considerably higher.*

**TABLE 2.**---*Status of* ***mountain pine beetle*** *infestations by state during 1992.*

**IDAHO**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 7.5 | 8.8 |
| Other Federal | 0.3 | 0.3 |
| State and Private | 1.1 | 1.4 |
| TOTAL | 8.9 | 10.5 |

**UTAH**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 3.4 | 3.0 |
| Other Federal | 0.4 | 0.3 |
| State and Private | 0.3 | 0.3 |
| TOTAL | 4.1 | 3.6 |

**WYOMING**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 4.5 | 2.3 |
| Other Federal | 0.8 | 0.4 |
| State and Private | 0.0 | 0.0 |
| TOTAL | 5.3 | 2.7 |

**TABLE 3.**---*Status of spruce beetle infestations by state during 1992.*

**IDAHO**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 29.9 | 30.1 |
| Other Federal | 1.0 | 1.0 |
| State and Private | 0.9 | 0.9 |
| TOTAL | 31.8 | 32.0 |

**UTAH**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 15.1 | 21.9 |
| Other Federal | 0.0 | 0.0 |
| State and Private | 0.8 | 1.2 |
| TOTAL | 15.9 | 23.1 |

**WYOMING**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 1.1 | 1.0 |
| Other Federal | 0.0 | 0.0 |
| State and Private | 0.0 | 0.0 |
| TOTAL | 1.1 | 1.0 |

**TABLE 4.**---*Status of* ***Douglas-fir beetle*** *infestations by state during 1992.*

**IDAHO**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 84.7 | 89.7 |
| Other Federal | 2.3 | 3.2 |
| State and Private | 12.7 | 12.6 |
| TOTAL | 99.7 | 105.5 |

**UTAH**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 3.1 | 5.1 |
| Other Federal | 0.0 | 0.0 |
| State and Private | 0.0 | 0.0 |
| TOTAL | 3.1 | 5.1 |

**WYOMING**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 1.7 | 7.5 |
| Other Federal | 1.1 | 0.5 |
| State and Private | 0.8 | 0.3 |
| TOTAL | 1.9 | 8.3 |

**TABLE 5.**---*Status of* ***western pine beetle*** *infestations by state during 1992.*

**IDAHO**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 7.0 | 7.1 |
| Other Federal | 0.0 | 0.0 |
| State and Private | 1.8 | 1.8 |
| TOTAL | 8.8 | 8.9 |

**TABLE 6.**---*Status of* ***Jeffrey pine beetle*** *infestations by state during 1992.*

**NEVADA**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 7.2 | 7.6 |
| Other Federal | 0.0 | 0.0 |
| State and Private | 3.1 | 3.3 |
| TOTAL | 10.3 | 10.9 |

**TABLE 7.**---*Status of* ***western balsam bark beetle*** *infestations by state during 1992.*

**IDAHO**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 44.0 | 60.3 |
| Other Federal | 0.0 | 0.0 |
| State and Private | 14.6 | 20.1 |
| TOTAL | 58.6 | 80.4 |

**UTAH**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 46.8 | 66.7 |
| Other Federal | 1.9 | 1.7 |
| State and Private | 0.6 | 1.8 |
| TOTAL | 49.3 | 70.2 |

**WYOMING**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 144.9 | 35.0 |
| Other Federal | 7.7 | 0.9 |
| State and Private | 1.5 | 0.9 |
| TOTAL | 154.1 | 36.8 |

**TABLE 8.**---*Status of **fir engraver beetle** infestations by state during 1992.*

**IDAHO**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 16.7 | 29.3 |
| Other Federal | 0.0 | 0.0 |
| State and Private | 7.2 | 12.6 |
| TOTAL | 23.9 | 41.9 |

**NEVADA**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 64.2 | 161.9 |
| Other Federal | 3.9 | 9.8 |
| State and Private | 9.3 | 23.4 |
| TOTAL | 77.4 | 195.1 |

**UTAH**

| Land Ownership Class | Outbreak Area (Thousand Acres) | Number of Trees (Thousands) |
|---|---|---|
| National Forest | 21.2 | 31.2 |
| Other Federal | 0.0 | 0.0 |
| State and Private | 1.1 | 1.6 |
| TOTAL | 22.3 | 32.8 |

**TABLE 9.**---*Acres of defoliation by* ***Douglas-fir tussock moth*** *in Region 4 during 1992 as determined by aerial detection surveys.*

| Forest and Adjacent Land | Defoliation Intensity | | | |
|---|---|---|---|---|
| | Light | Moderate | Heavy | TOTAL |
| Boise | 28,700 | 47,900 | 154,500 | 231,100 |
| Payette | 19,400 | 22,700 | 6,400 | 48,500 |
| Sawtooth | 19,000 | 15,200 | 89,200 | 123,400 |
| Owyhee County | 0 | 0 | 15,000 | 15,000 |
| Wasatch-Cache | 100 | 100 | 3,000 | 3,200 |
| R-4 TOTALS | 67,200 | 85,900 | 268,100 | 421,200 |

**TABLE 10.**---*Status of* ***Douglas-fir tussock moth*** *defoliation by state during 1992.*

**IDAHO**

| Land Ownership Class | Outbreak Area (Thousand Acres) |
|---|---|
| National Forest | 376.2 |
| Other Federal | 8.3 |
| State and Private | 33.5 |
| TOTAL | 418.0 |

**UTAH**

| Land Ownership Class | Outbreak Area (Thousand Acres) |
|---|---|
| National Forest | 2.7 |
| Other Federal | 0.0 |
| State and Private | 0.5 |
| TOTAL | 3.2 |

**TABLE 11.**---*Acres of defoliation by* ***western spruce budworm*** *in Region 4 during 1992 as determined by aerial detection surveys.*

| Forest and* Adjacent Land | Defoliation Intensity | | | |
|---|---|---|---|---|
| | Light | Moderate | Heavy | TOTAL |
| Challis | 3,300 | 600 | 0 | 3,900 |
| Salmon | 18,900 | 7,600 | 1,600 | 28,100 |
| R-4 TOTALS | 22,200 | 8,200 | 1,600 | 32,000 |

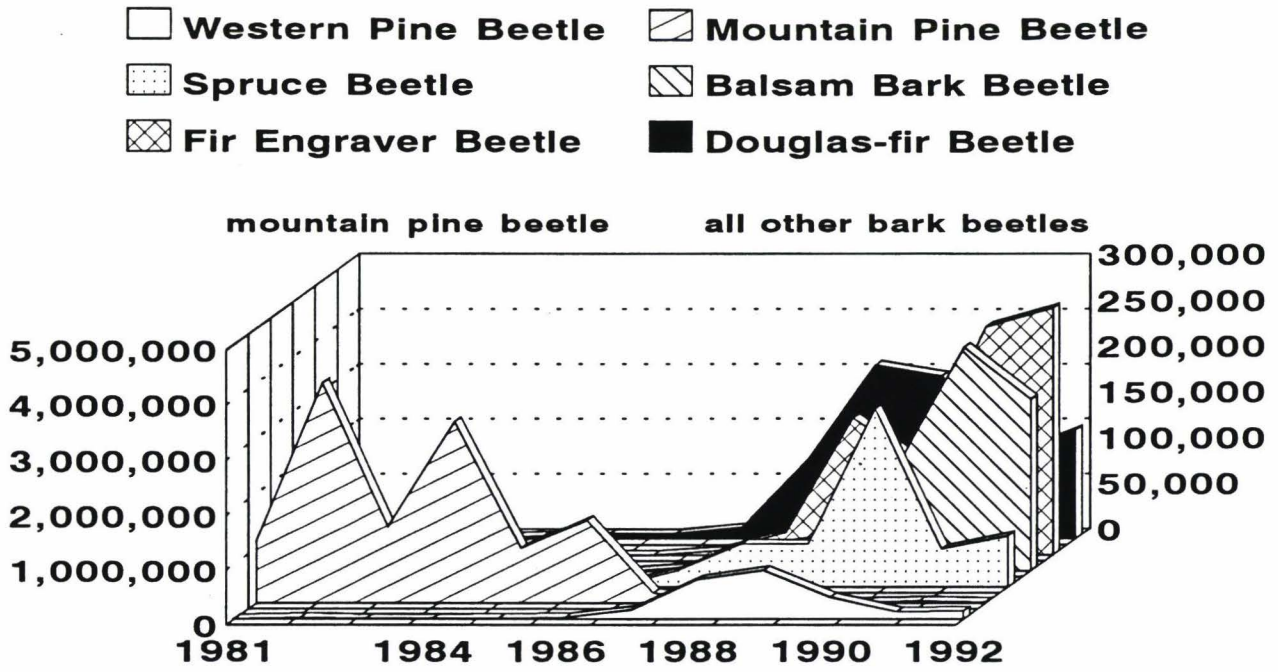
*Only portions of Forests flown; actual acreage may be greater.

**TABLE 12.**---*Status of* ***western spruce budworm*** *defoliation by state during 1992.*

**IDAHO**

| Land Ownership Class | Outbreak Area (Thousand Acres) |
|---|---|
| National Forest | 32.0 |
| Other Federal | 0.0 |
| State and Private | 0.0 |
| TOTAL | 32.0 |

# Trees Killed by Bark Beetles in the Intermountain Region 1981 - 1992




# Acres Defoliated by Douglas-fir Tussock Moth & Western Spruce Budworm Intermountain Region 1960 - 1992

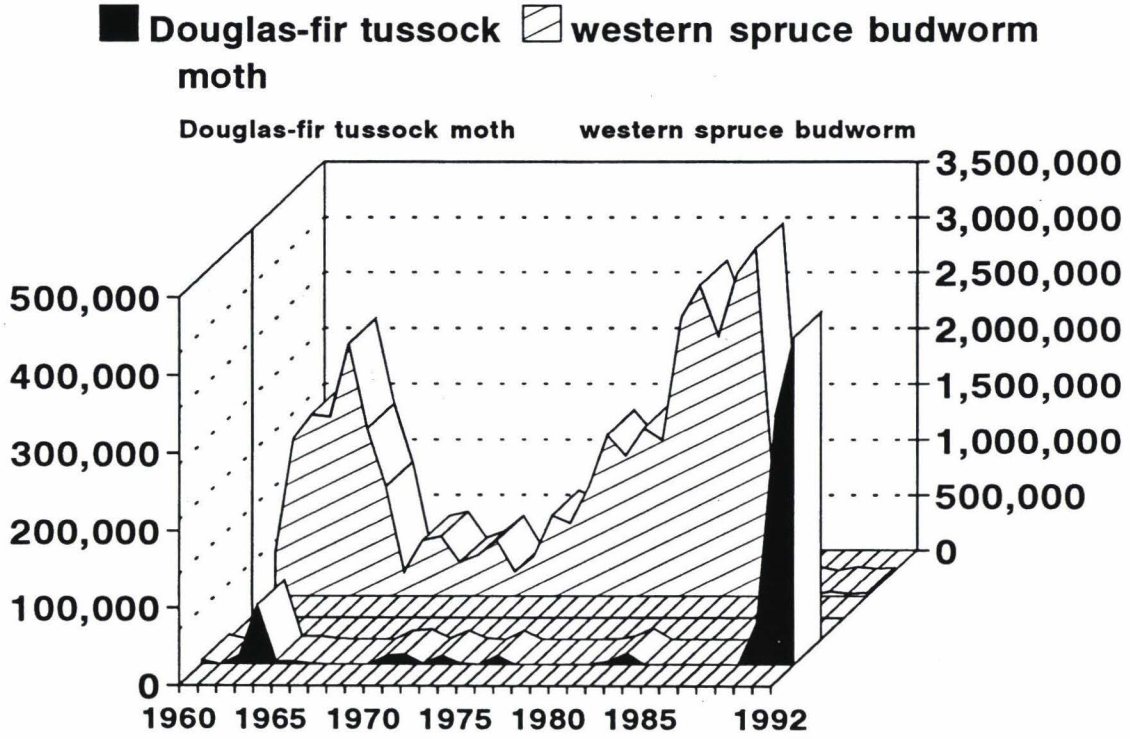


Figure 3. Areas infested by mountain pine beetle and Jeffrey pine beetle in Region 4 during 1992 as observed during aerial detection surveys.

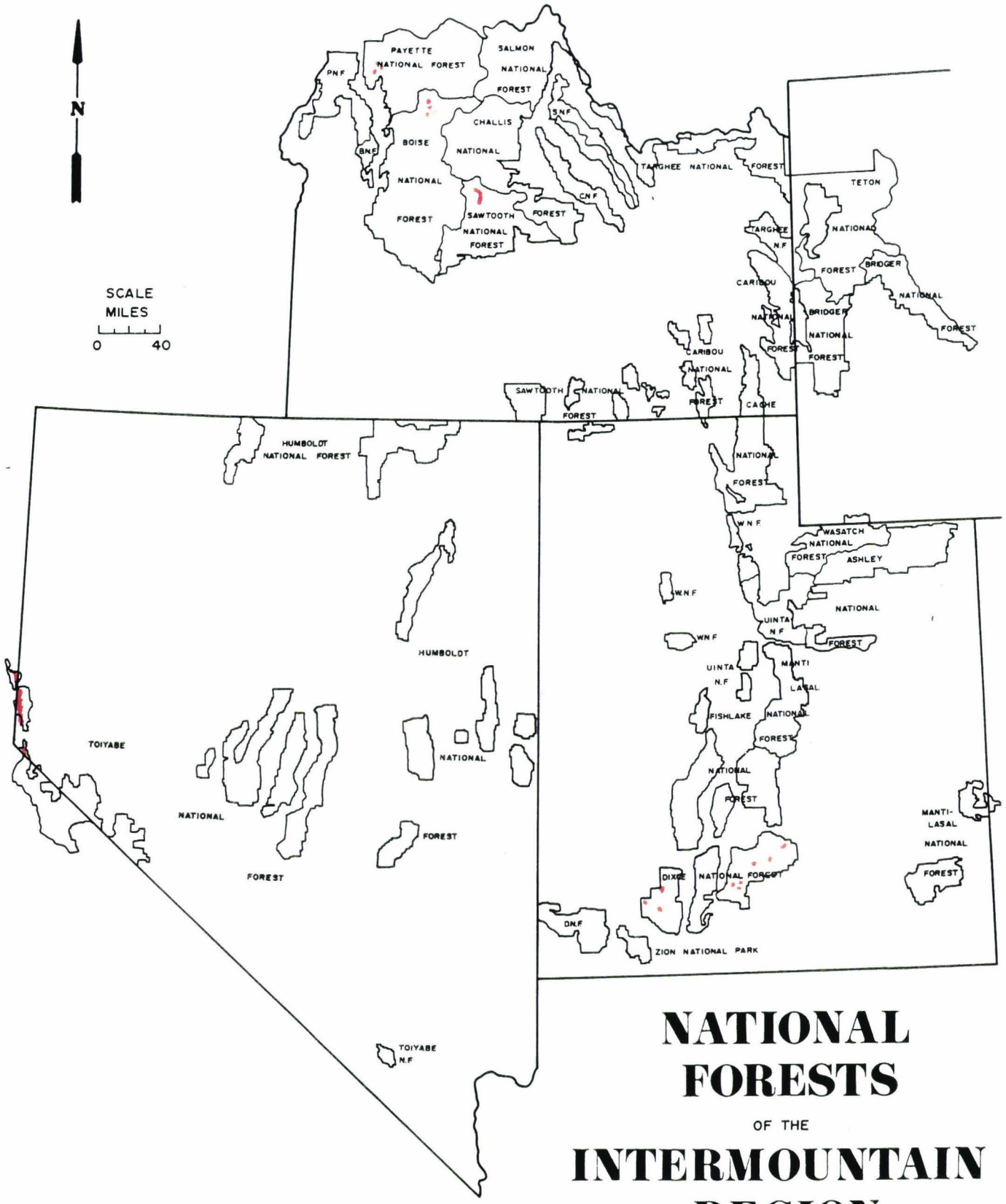


Figure 4. Areas infested by spruce beetle in Region 4 during 1992 as observed during aerial detection surveys.

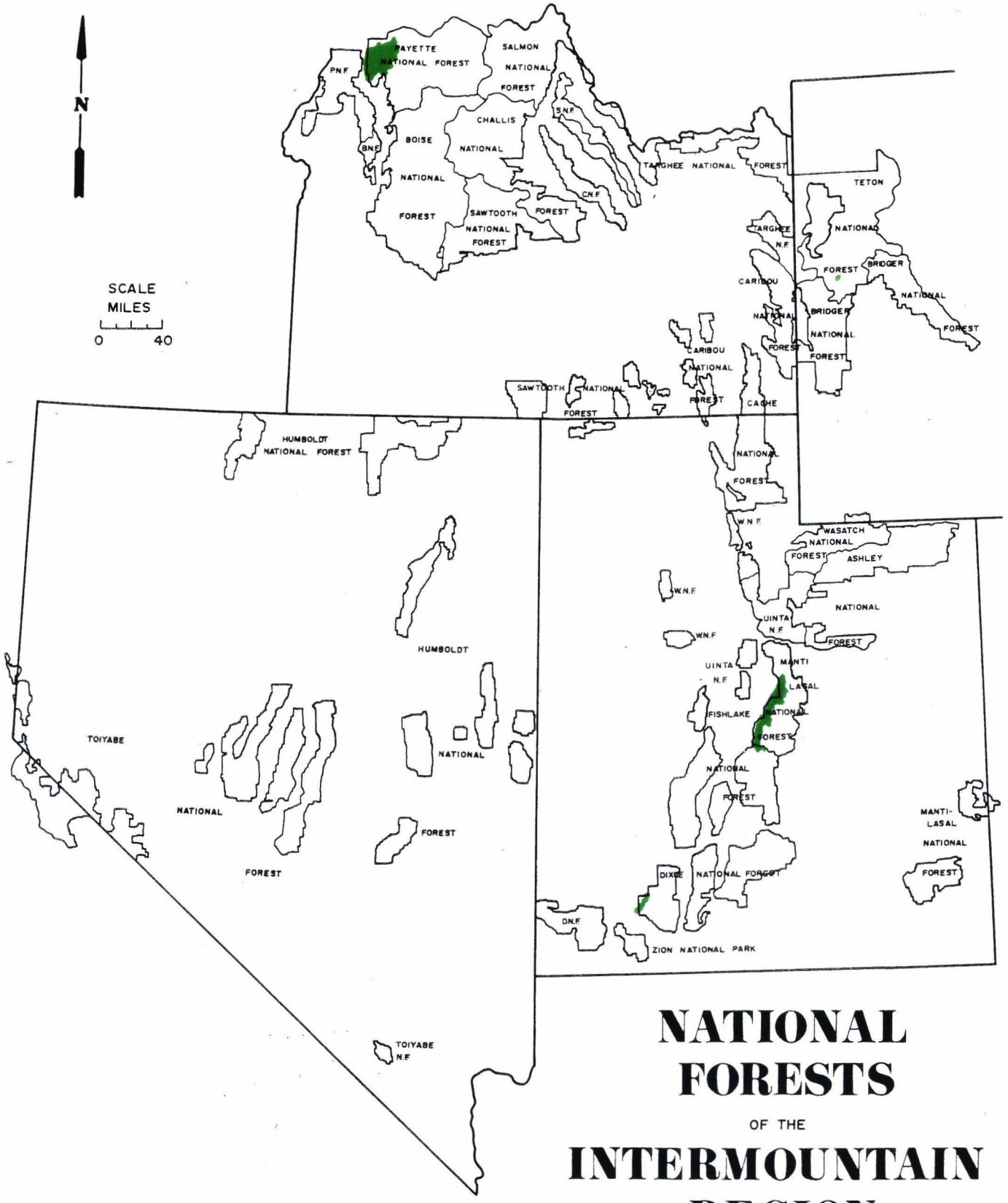


Figure 5 Areas infested by Douglas-fir beetle in Region 4 during 1992 as observed during aerial detection surveys.

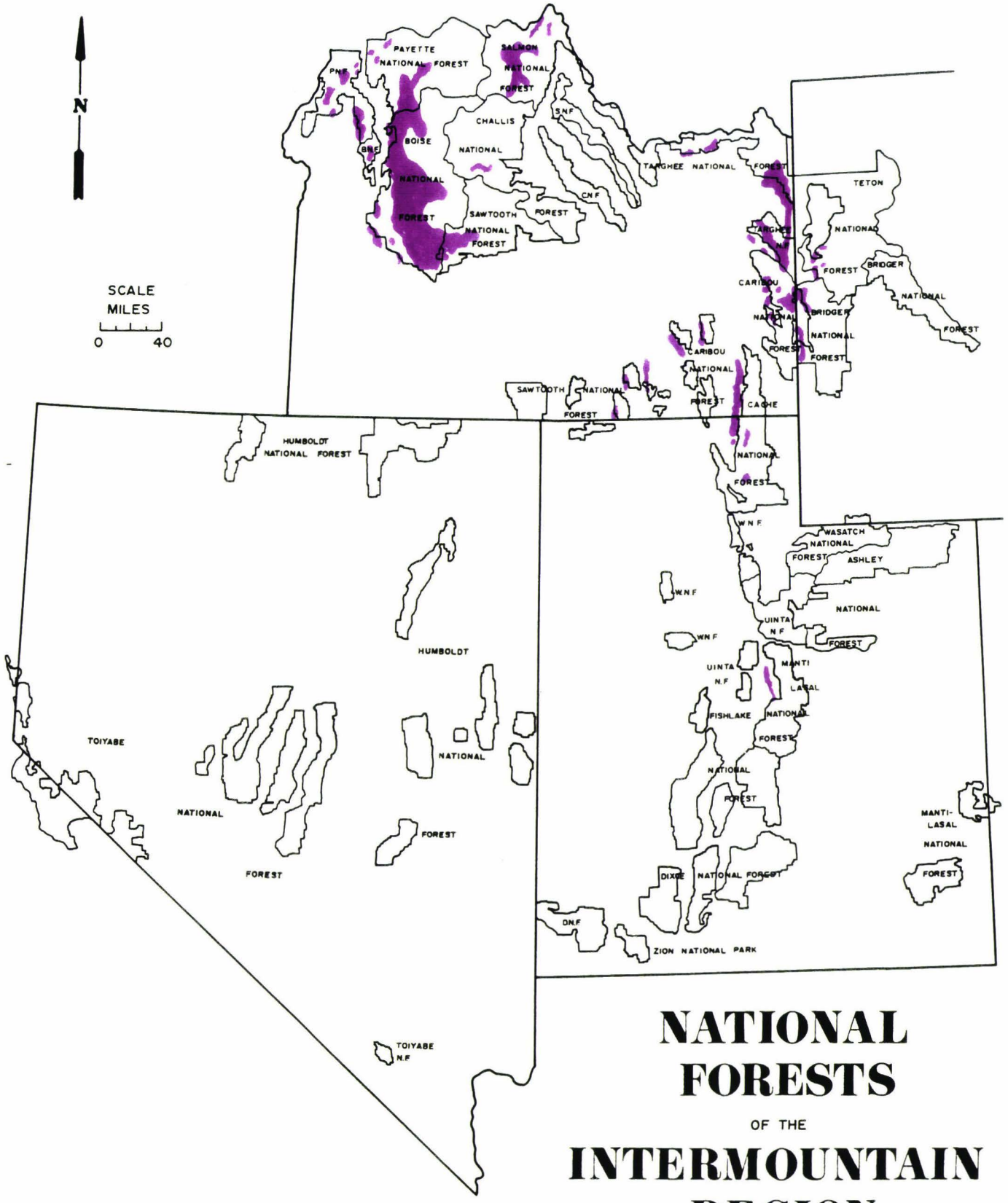


Figure 6. Areas infested by western pine beetle and pine engraver beetles in Region 4 during 1992 as observed during aerial detection surveys.

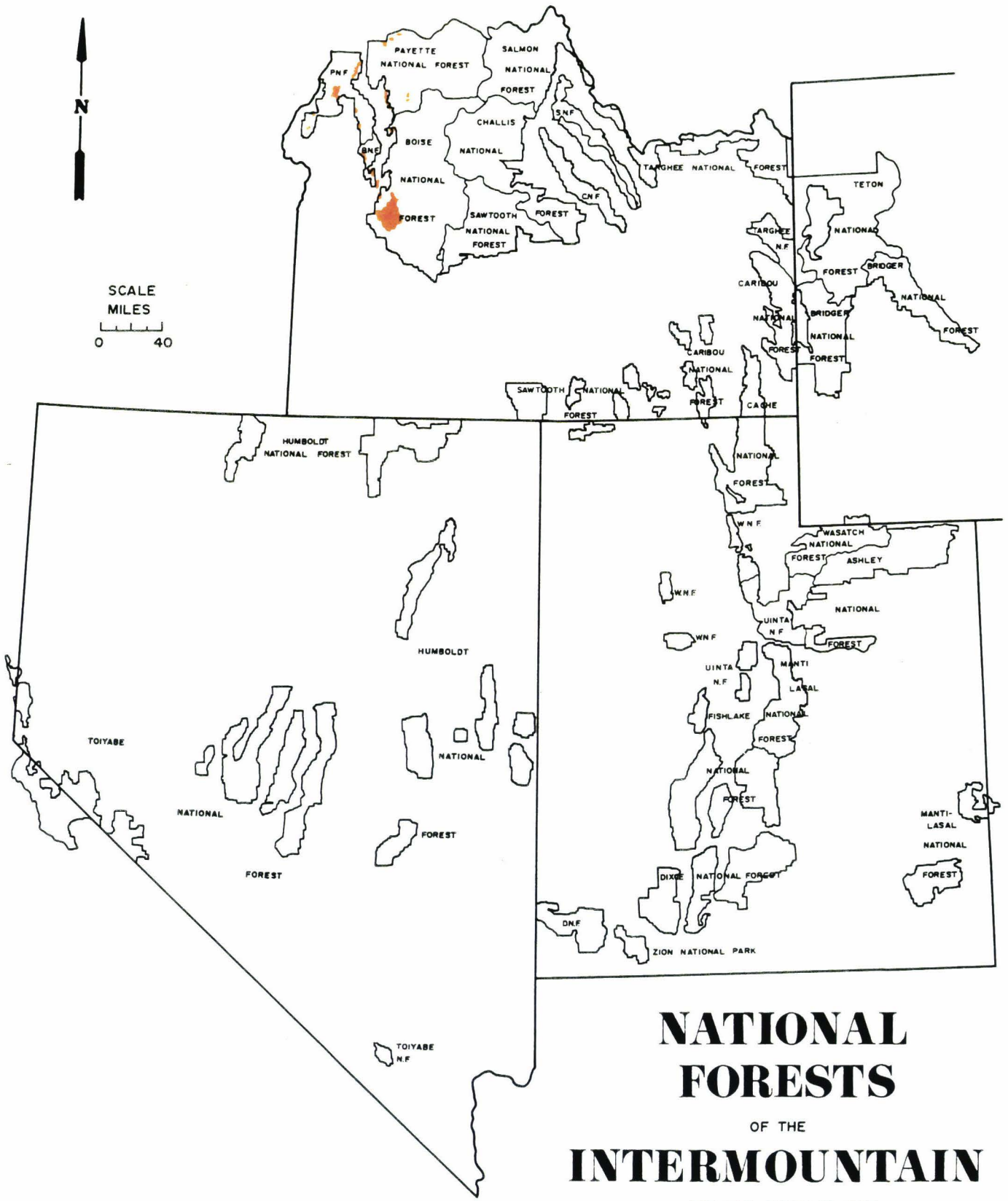
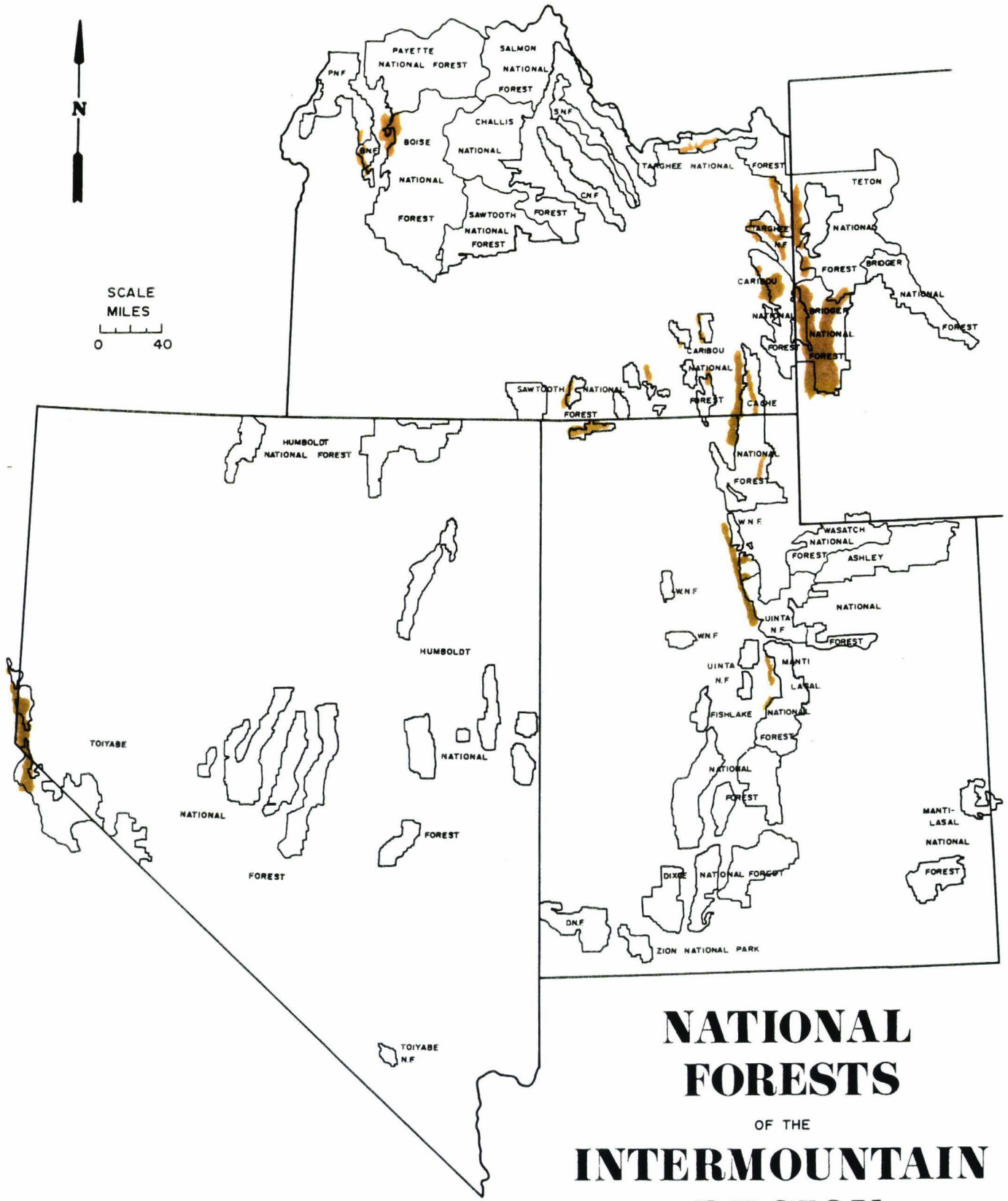
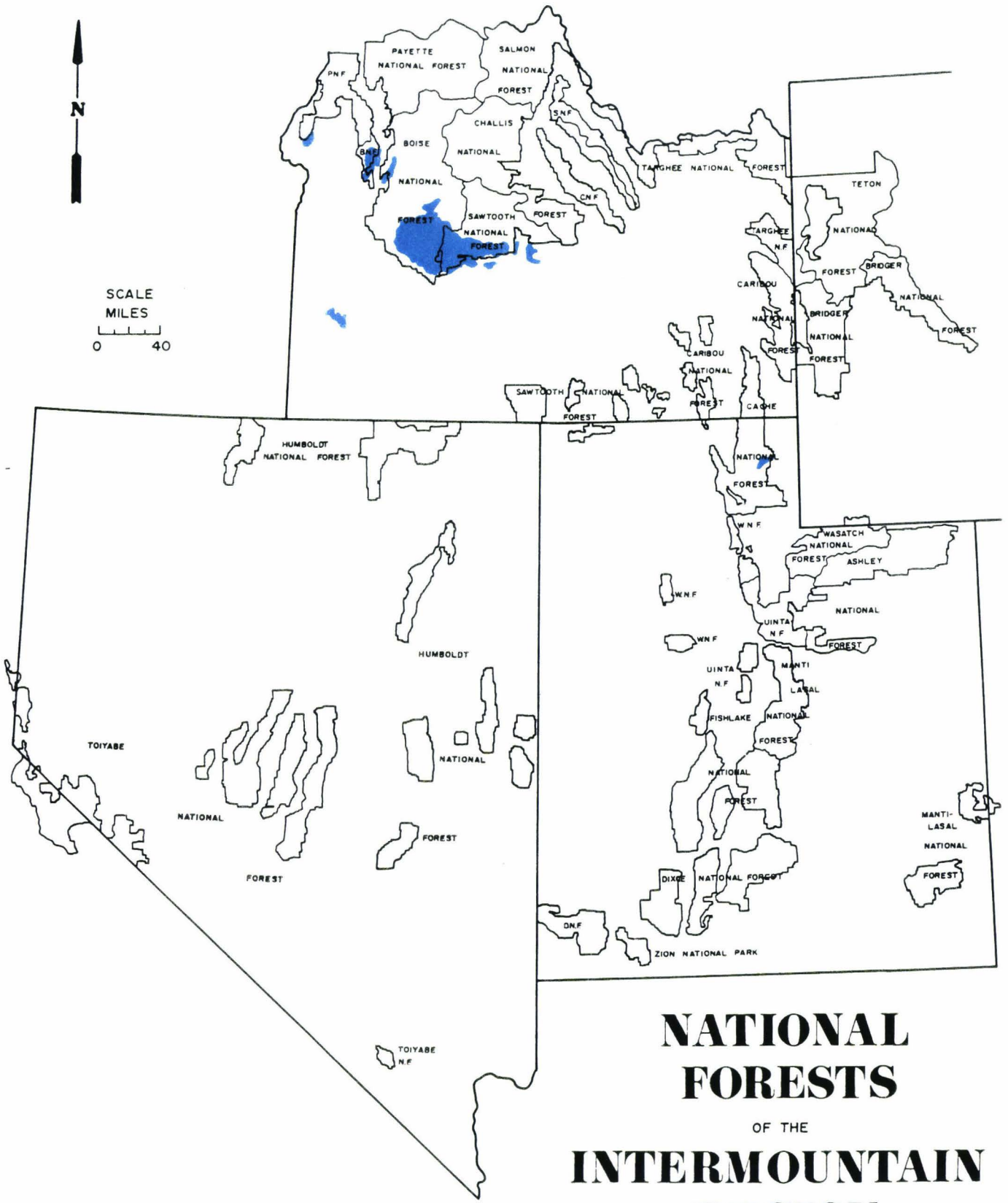


Figure 7. Areas infested by fir engraver beetle and western balsam bark beetles in Region 4 during 1992 as observed during aerial detection surveys.




# NATIONAL FORESTS OF THE INTERMOUNTAIN REGION

Figure 8. Areas infested by Douglas fir tussock moth in Region 4 during 1992 as observed during aerial detection surveys.




# NATIONAL FORESTS OF THE INTERMOUNTAIN REGION

**Field Test of TM BioControl-1.** A DFTM BioControl-1 rate study was conducted on the Boise National Forest near Featherville, Idaho during 1991 and 1992. Fifteen 40-acre plots were identified. Treatments consisted of applications of the labelled rate, half the labelled rate, and a no treatment control.

Pre-treatment larval populations were sampled within 72 hours of the spray application using lower crown beating techniques. Post-treatment samples were completed approximately 21 days after treatment. In addition, foliage samples were taken from all treatment blocks every five days and fed to lab colony larvae in order to determine the effective duration of the virus in the field.

Long term persistence in the soil was determined by taking soil samples from each plot prior to spray application and after the application in the fall of 1991 and in the spring of 1992.

Applications were completed on schedule during early July 1991. Coverage appeared to be satisfactory. Efficacy was unacceptable. Lab bioassays were initiated in order to determine why the applications did not effectively reduce the population. Preliminary results from the bioassays indicate that effective dosages of TM BioControl-1 are much higher for field strains than for the Blue Lakes lab strain of tussock moth.

**Douglas-fir Tussock Moth Mating Disruption Pilot Test.** This test was intended to demonstrate the feasibility of using a mating disruption technique as an operational suppression tactic. Pheromone loaded in fibers and mixed with a sticker was applied via helicopter to 600 acres in the Manns Creek drainage on the Weiser Ranger District, Payette National Forest.

Applications were completed in mid August 1991. Coverage appeared good and timely. Materials performed adequately. Treatment reduced the next years larval population by about 81 percent in treated versus untreated blocks. In treated blocks only 16 percent of emerged females produced fertile eggs versus 72 percent in untreated blocks. Treatment had no measurable effect on carpenter ants, western spruce budworm, or spiders.

In summary, efficacy is arguably as good, or better, than for most of the alternatives such as B.t., or conventional pesticides, but probably lower than that of the DFTM virus at high population densities where virus is likely most effective.

**Permanent Plots to Validate the Dwarf Mistletoe Extension of PROGNOSIS Model.** The purpose of this ongoing, westwide project is to establish a database to validate and calibrate the dwarf mistletoe model linked to the Prognosis Stand Development Model. Seventeen new permanent plots were established on the Wasatch-Cache and Ashley National Forests. A database was created by FPM-MAG to house data from all types of permanent plots. This database may be useful for other types of data other than pest permanent plots. It could be used for timber and range plot data as well.

**Westwide Pine Bark Beetle Impact Model.** This has been the first year of a model development project to predict the impacts of mountain pine beetle on ponderosa and lodgepole pine, western pine beetle, and *Ips* in western forests. The existing bark beetle models which are linked to the Prognosis Stand Development Model include mountain pine beetle for lodgepole pine and Douglas-fir beetle

creating a need for a new model. Region 4 and FPM-MAG are the main cooperators of this project, along with a core group of personnel from different regions involved with bark beetle management and research. The model development work has been contracted to a private company, ESSA Environmental and Social Systems Analysts Ltd. ESSA has used a participation workshop format to collect information necessary to develop the prototype model. The prototype model has been completed and is currently being reviewed by Forest Service cooperators. It is expected that the final model will be available for use by late 1993 and will most likely be linked to the Prognosis Stand Development Model.

**Development of Aerial Video For Operational Use in FPM Programs**. This multiyear technology development project will identify capabilities of and guidelines for the operational use of aerial video in detecting and montioring a variety of pest activities. In 1992, five test sites located in Utah, Idaho, and Montana were identified by R-4 and imagery was obtained by the Methods Application Group. Image analysis and ground truth surveys will be completed in 1993.

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